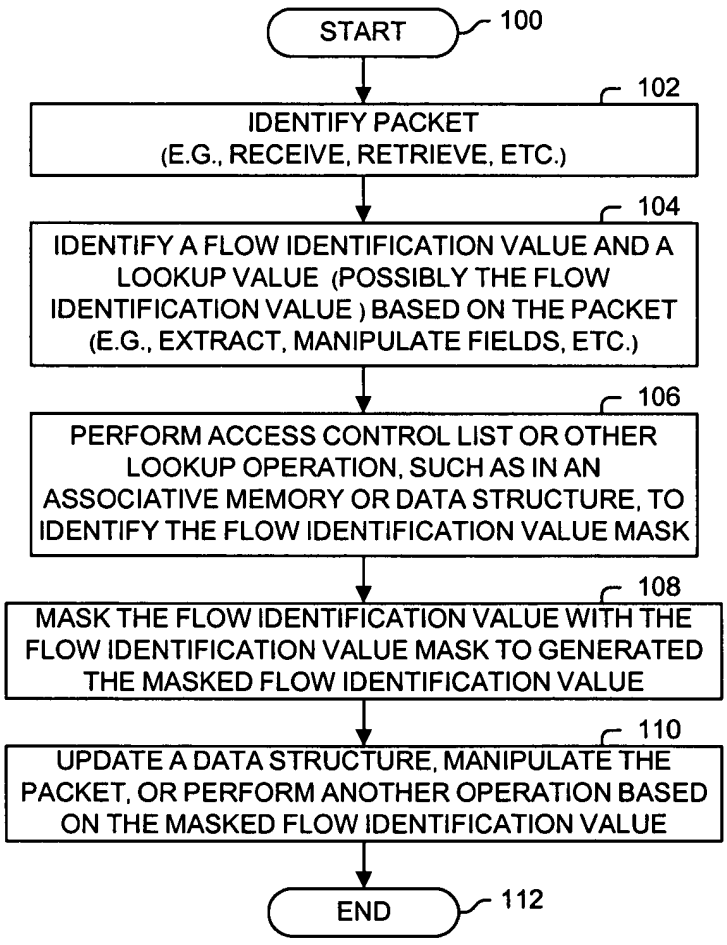
START
100
102
IDENTIFY PACKET
(E.G., RECEIVE, RETRIEVE, ETC.)
104
IDENTIFY A FLOW IDENTIFICATION VALUE AND A LOOKUP VALUE (POSSIBLY THE FLOW IDENTIFICATION VALUE) BASED ON THE PACKET
(E.G., EXTRACT, MANIPULATE FIELDS, ETC.)
106
PERFORM ACCESS CONTROL LIST OR OTHER LOOKUP OPERATION, SUCH AS IN AN ASSOCIATIVE MEMORY OR DATA STRUCTURE, TO IDENTIFY THE FLOW IDENTIFICATION VALUE MASK
108
MASK THE FLOW IDENTIFICATION VALUE WITH THE FLOW IDENTIFICATION VALUE MASK TO GENERATED THE MASKED FLOW IDENTIFICATION VALUE
110
UPDATE A DATA STRUCTURE, MANIPULATE THE PACKET, OR PERFORM ANOTHER OPERATION BASED ON THE MASKED FLOW IDENTIFICATION VALUE
END
112

FIGURE 1A

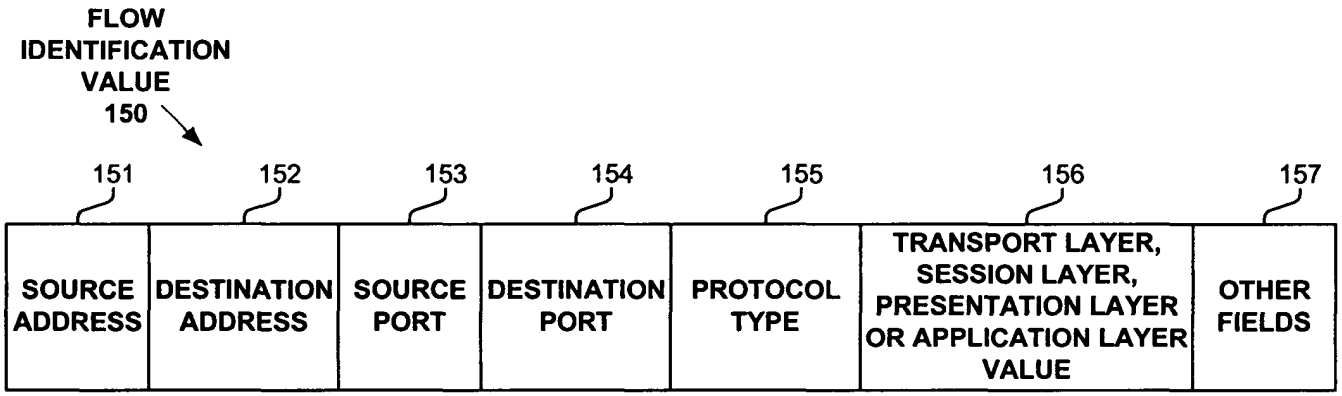
FLOW IDENTIFICATION VALUE 150
151
152
153
154
155
156
157
SOURCE ADDRESS
DESTINATION ADDRESS
SOURCE PORT
DESTINATION PORT
PROTOCOL TYPE
TRANSPORT LAYER, SESSION LAYER, PRESENTATION LAYER OR APPLICATION LAYER VALUE
OTHER FIELDS

FIGURE 1B

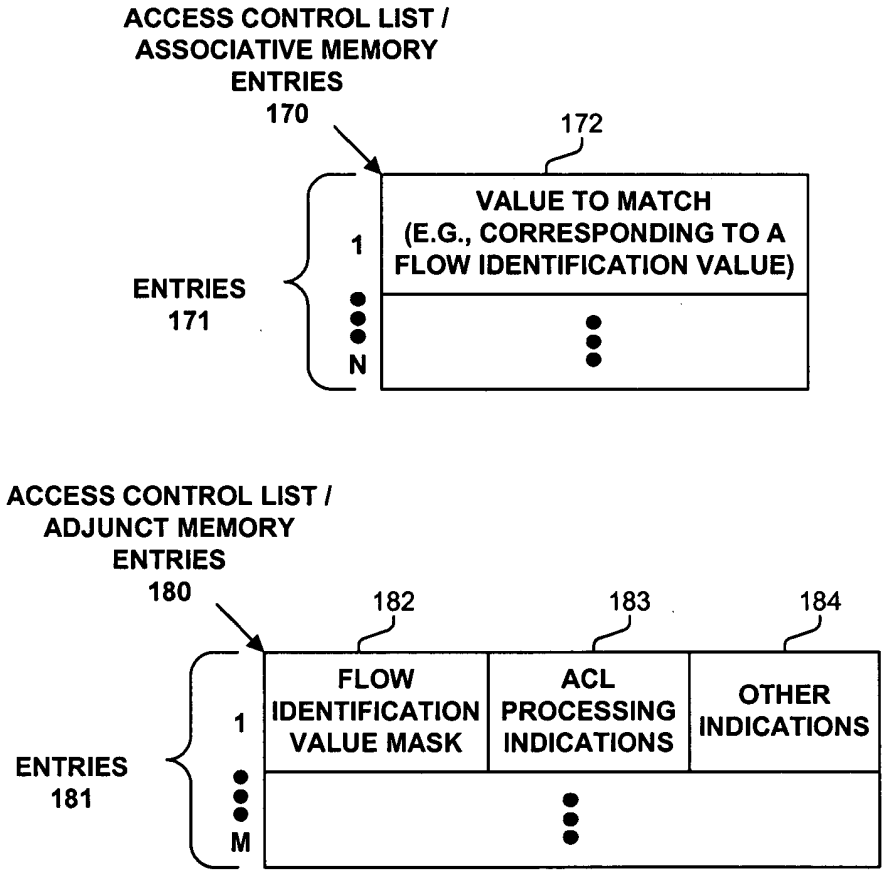
ACCESS CONTROL LIST / ASSOCIATIVE MEMORY ENTRIES 170
172
VALUE TO MATCH (E.G., CORRESPONDING TO A FLOW IDENTIFICATION VALUE)
ENTRIES 171
1
N
ACCESS CONTROL LIST / ADJUNCT MEMORY ENTRIES 180
182
183
184
FLOW IDENTIFICATION VALUE MASK
ACL PROCESSING INDICATIONS
OTHER INDICATIONS
ENTRIES 181
1
M

FIGURE 1C

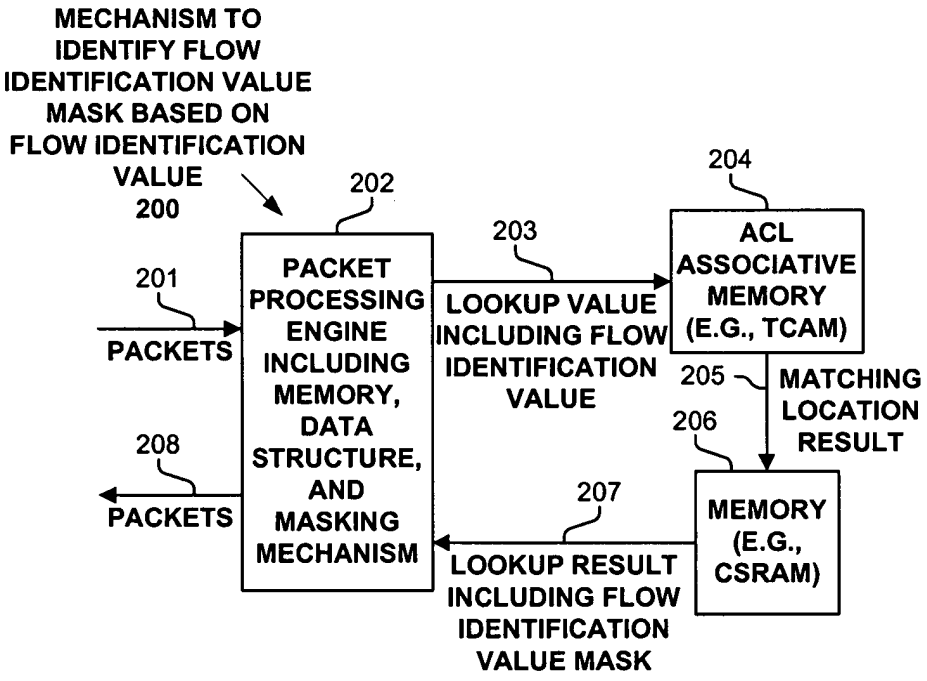
MECHANISM TO IDENTIFY FLOW IDENTIFICATION VALUE MASK BASED ON FLOW IDENTIFICATION VALUE
200
202
204
203
201
PACKETS
PACKET PROCESSING ENGINE INCLUDING MEMORY, DATA STRUCTURE, AND MASKING MECHANISM
LOOKUP VALUE INCLUDING FLOW IDENTIFICATION VALUE
ACL ASSOCIATIVE MEMORY (E.G., TCAM)
205
MATCHING LOCATION RESULT
206
208
PACKETS
207
MEMORY (E.G., CSRAM)
LOOKUP RESULT INCLUDING FLOW IDENTIFICATION VALUE MASK

FIGURE 2A

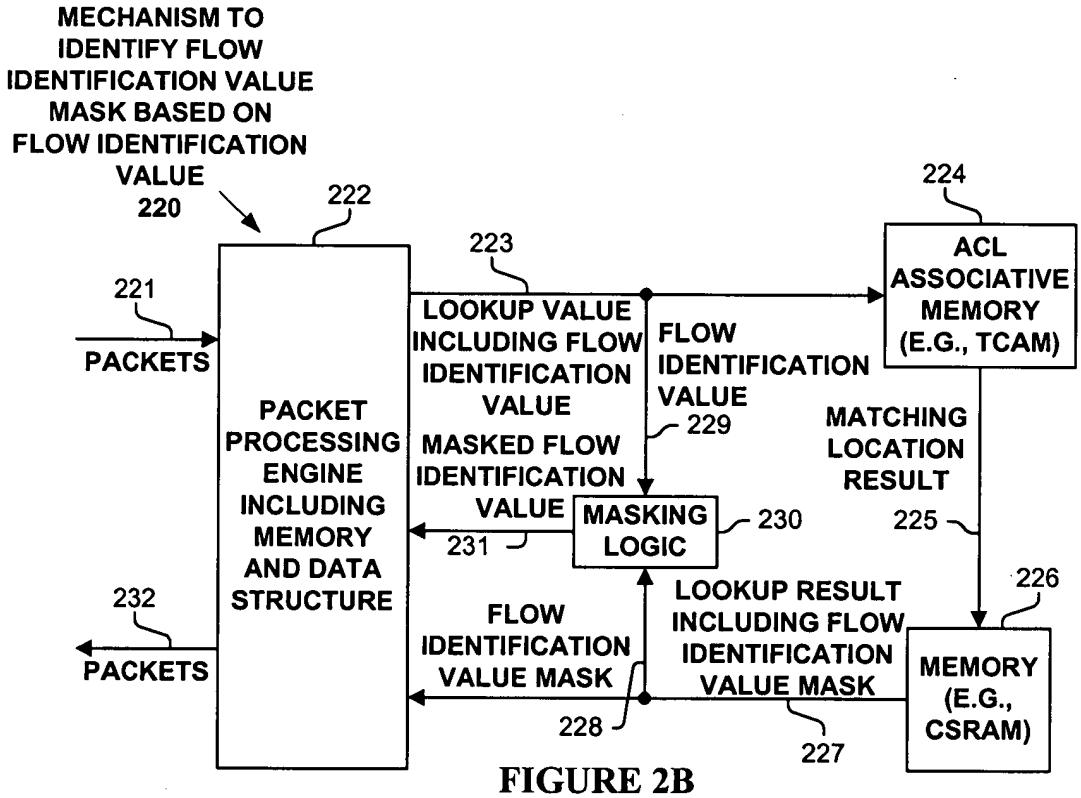
MECHANISM TO IDENTIFY FLOW IDENTIFICATION VALUE MASK BASED ON FLOW IDENTIFICATION VALUE
220
222
224
223
ACL ASSOCIATIVE MEMORY (E.G., TCAM)
221
PACKETS
LOOKUP VALUE INCLUDING FLOW IDENTIFICATION VALUE
FLOW IDENTIFICATION VALUE
229
PACKET PROCESSING ENGINE INCLUDING MEMORY AND DATA STRUCTURE
MASKED FLOW IDENTIFICATION VALUE
MATCHING LOCATION RESULT
MASKING LOGIC
230
225
231
226
232
LOOKUP RESULT INCLUDING FLOW IDENTIFICATION VALUE MASK
FLOW IDENTIFICATION VALUE MASK
MEMORY (E.G., CSRAM)
PACKETS
228
227

FIGURE 2B

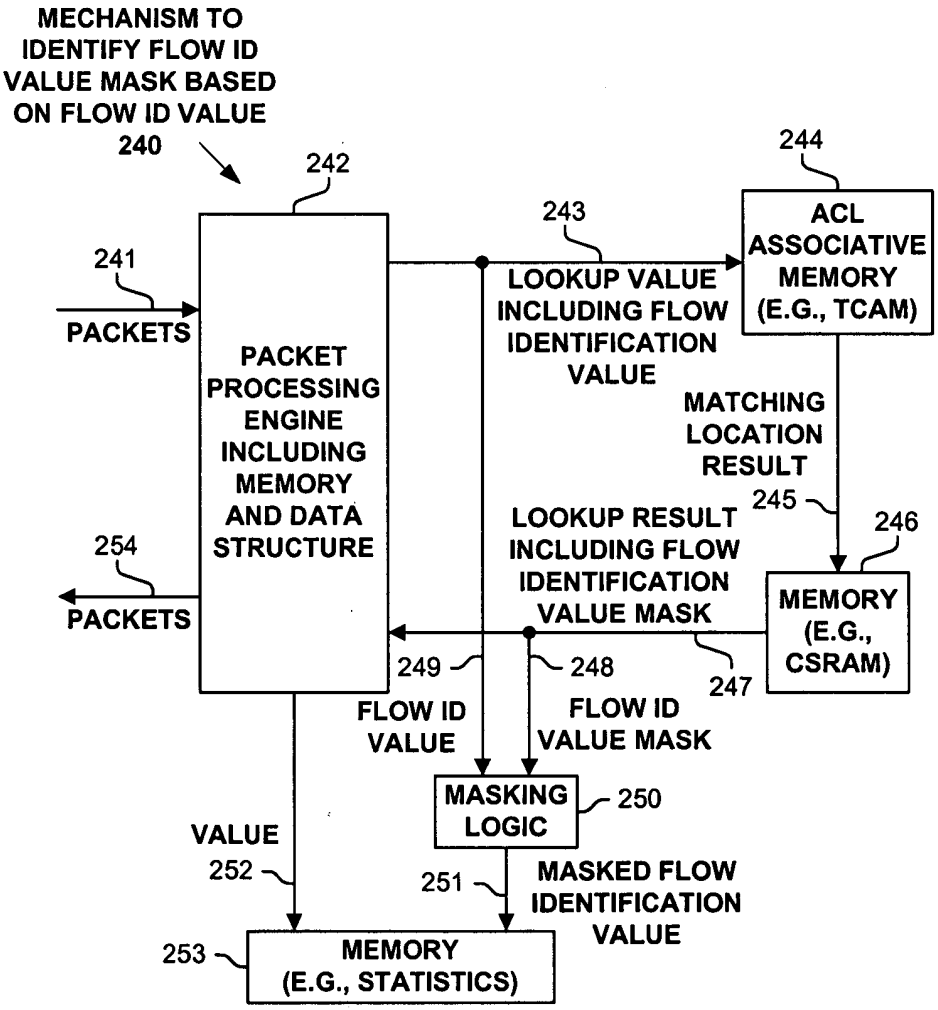
MECHANISM TO IDENTIFY FLOW ID VALUE MASK BASED ON FLOW ID VALUE
240
242
244
243
ACL ASSOCIATIVE MEMORY (E.G., TCAM)
241
PACKETS
PACKET PROCESSING ENGINE INCLUDING MEMORY AND DATA STRUCTURE
LOOKUP VALUE INCLUDING FLOW IDENTIFICATION VALUE
MATCHING LOCATION RESULT
245
246
254
PACKETS
LOOKUP RESULT INCLUDING FLOW IDENTIFICATION VALUE MASK
MEMORY (E.G., CSRAM)
249
248
247
FLOW ID VALUE
FLOW ID VALUE MASK
MASKING LOGIC
250
VALUE
252
251
MASKED FLOW IDENTIFICATION VALUE
253
MEMORY (E.G., STATISTICS)

FIGURE 2C

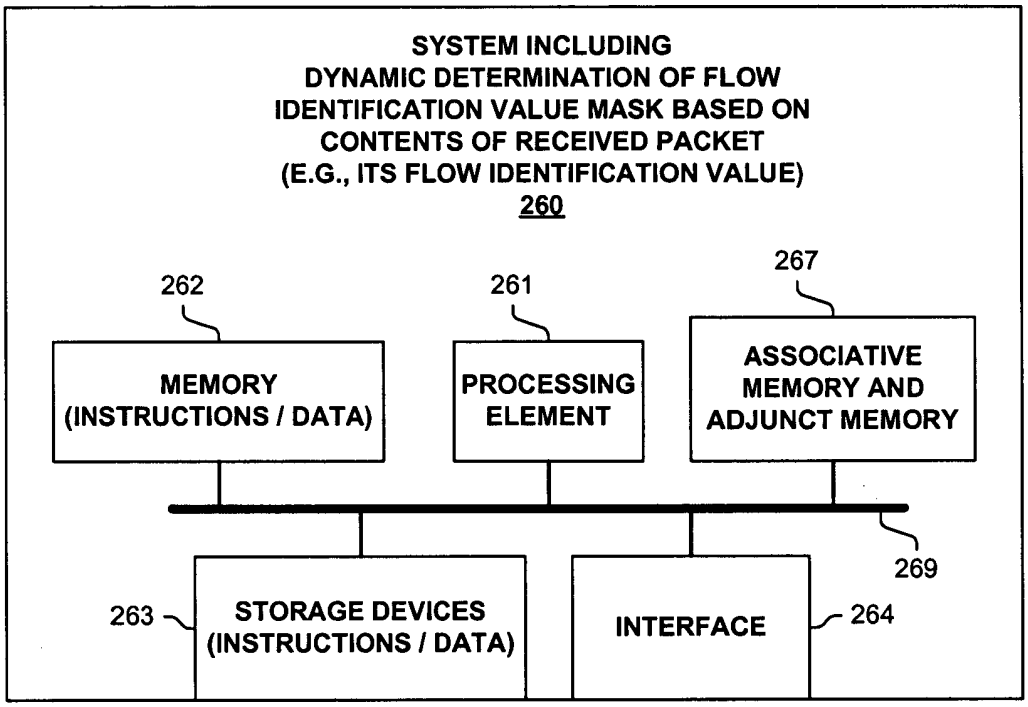
SYSTEM INCLUDING
DYNAMIC DETERMINATION OF FLOW
IDENTIFICATION VALUE MASK BASED ON
CONTENTS OF RECEIVED PACKET
(E.G., ITS FLOW IDENTIFICATION VALUE)
260
262
261
267
MEMORY
(INSTRUCTIONS / DATA)
PROCESSING
ELEMENT
ASSOCIATIVE
MEMORY AND
ADJUNCT MEMORY
269
263
STORAGE DEVICES
(INSTRUCTIONS / DATA)
INTERFACE
264

FIGURE 2D

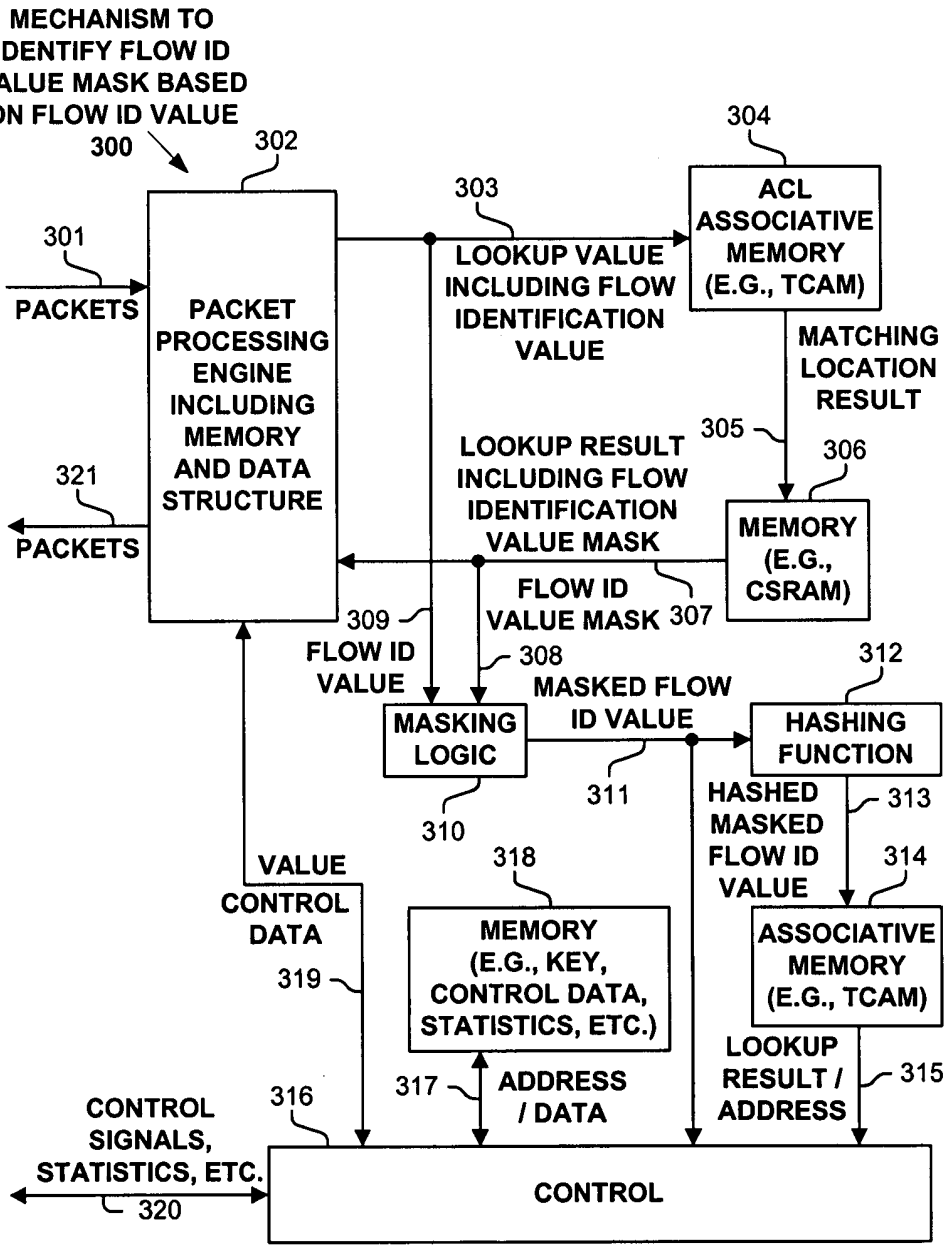
MECHANISM TO IDENTIFY FLOW ID VALUE MASK BASED ON FLOW ID VALUE
300
302
304
303
301
PACKETS
PACKET PROCESSING ENGINE INCLUDING MEMORY AND DATA STRUCTURE
LOOKUP VALUE INCLUDING FLOW IDENTIFICATION VALUE
ACL ASSOCIATIVE MEMORY (E.G., TCAM)
MATCHING LOCATION RESULT
305
306
321
PACKETS
LOOKUP RESULT INCLUDING FLOW IDENTIFICATION VALUE MASK
MEMORY (E.G., CSRAM)
FLOW ID VALUE MASK
307
309
FLOW ID VALUE
308
312
MASKED FLOW ID VALUE
MASKING LOGIC
HASHING FUNCTION
311
310
HASHED MASKED FLOW ID VALUE
313
314
318
VALUE CONTROL DATA
MEMORY (E.G., KEY, CONTROL DATA, STATISTICS, ETC.)
ASSOCIATIVE MEMORY (E.G., TCAM)
319
LOOKUP RESULT / ADDRESS
315
317
ADDRESS / DATA
316
CONTROL SIGNALS, STATISTICS, ETC.
320
CONTROL

FIGURE 3A

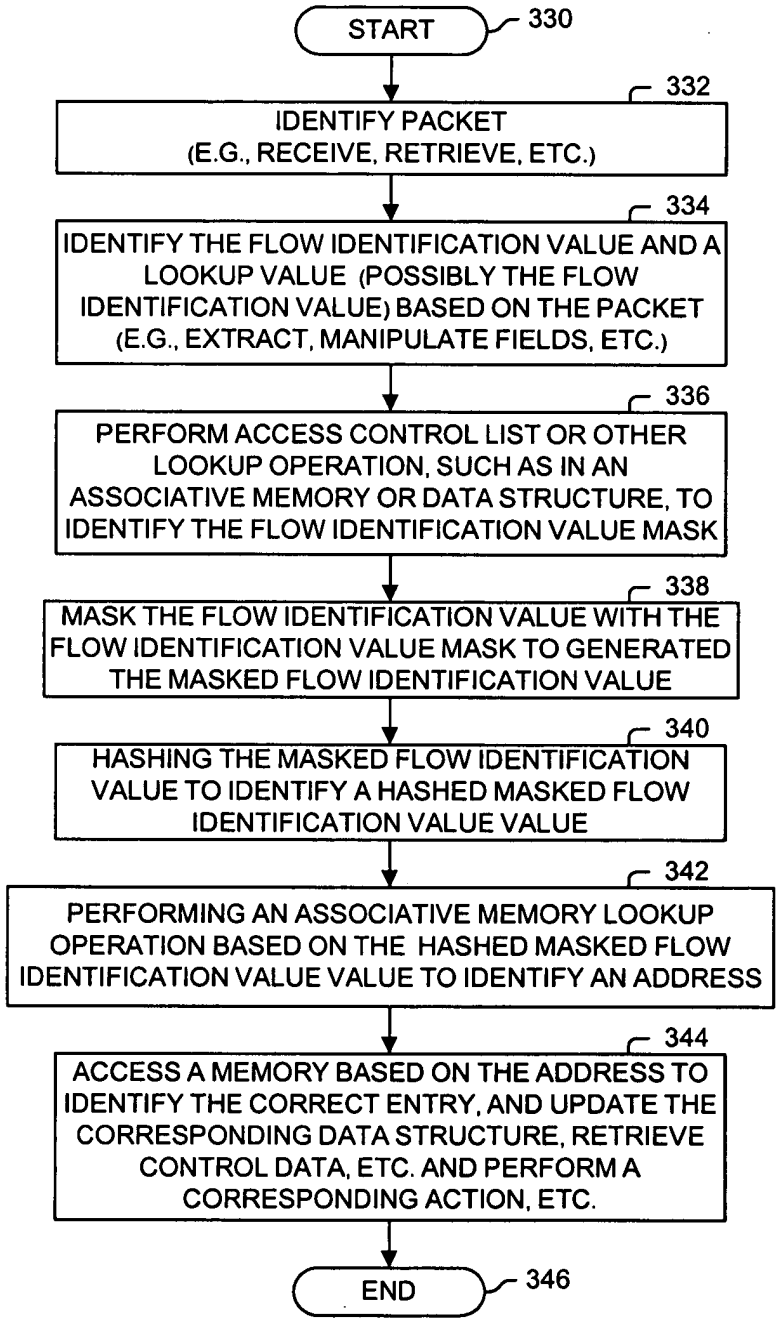
START
330
332
IDENTIFY PACKET
(E.G., RECEIVE, RETRIEVE, ETC.)
334
IDENTIFY THE FLOW IDENTIFICATION VALUE AND A LOOKUP VALUE (POSSIBLY THE FLOW IDENTIFICATION VALUE) BASED ON THE PACKET (E.G., EXTRACT, MANIPULATE FIELDS, ETC.)
336
PERFORM ACCESS CONTROL LIST OR OTHER LOOKUP OPERATION, SUCH AS IN AN ASSOCIATIVE MEMORY OR DATA STRUCTURE, TO IDENTIFY THE FLOW IDENTIFICATION VALUE MASK
338
MASK THE FLOW IDENTIFICATION VALUE WITH THE FLOW IDENTIFICATION VALUE MASK TO GENERATED THE MASKED FLOW IDENTIFICATION VALUE
340
HASHING THE MASKED FLOW IDENTIFICATION VALUE TO IDENTIFY A HASHED MASKED FLOW IDENTIFICATION VALUE VALUE
342
PERFORMING AN ASSOCIATIVE MEMORY LOOKUP OPERATION BASED ON THE HASHED MASKED FLOW IDENTIFICATION VALUE VALUE TO IDENTIFY AN ADDRESS
344
ACCESS A MEMORY BASED ON THE ADDRESS TO IDENTIFY THE CORRECT ENTRY, AND UPDATE THE CORRESPONDING DATA STRUCTURE, RETRIEVE CONTROL DATA, ETC. AND PERFORM A CORRESPONDING ACTION, ETC.
END
346

FIGURE 3B

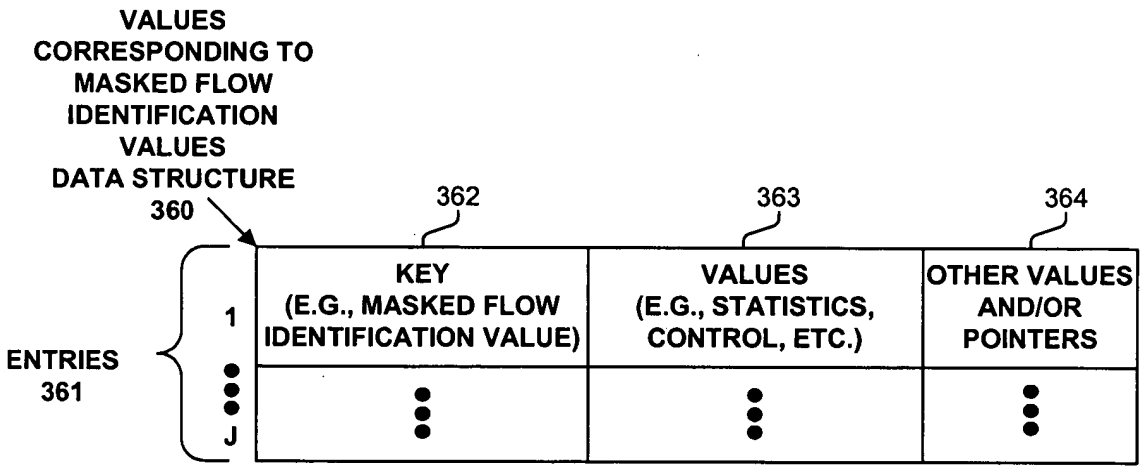

FIGURE 3C

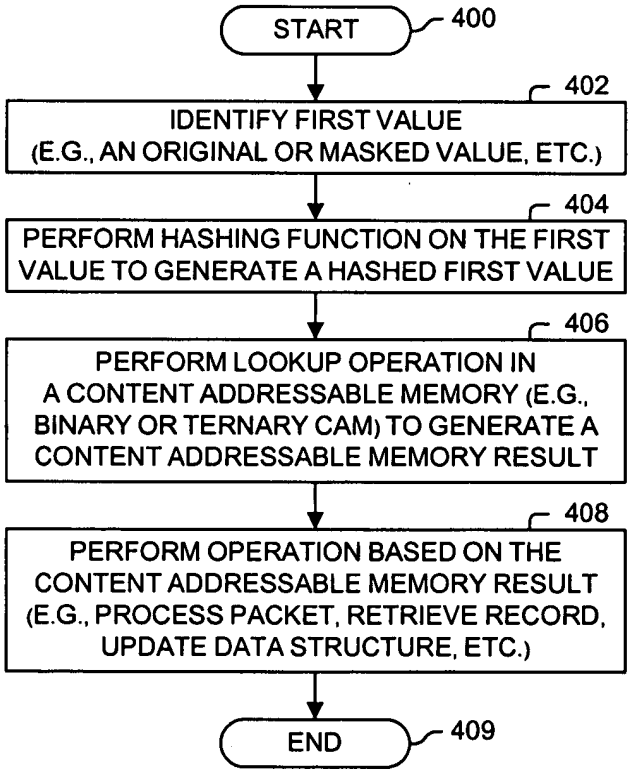

FIGURE 4A

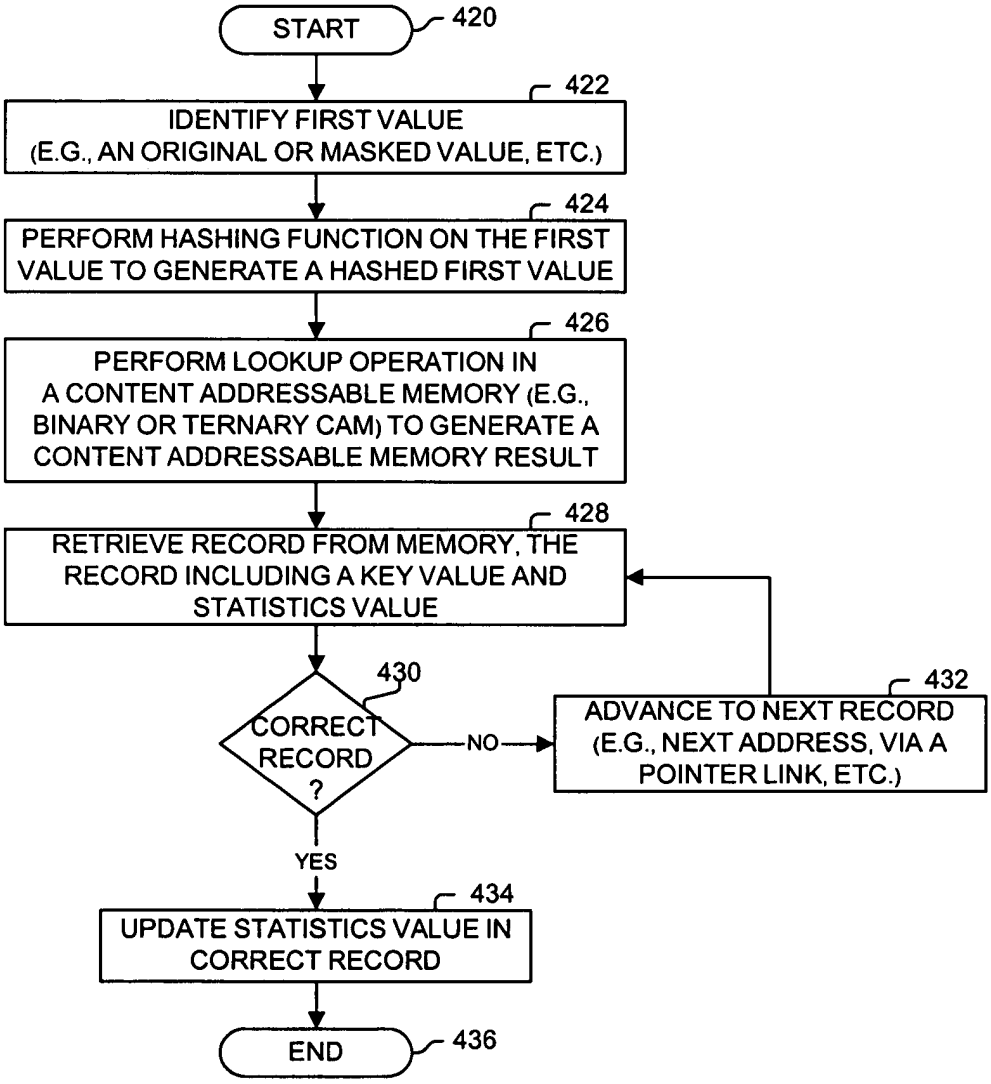
START
420
422
IDENTIFY FIRST VALUE
(E.G., AN ORIGINAL OR MASKED VALUE, ETC.)
424
PERFORM HASHING FUNCTION ON THE FIRST VALUE TO GENERATE A HASHED FIRST VALUE
426
PERFORM LOOKUP OPERATION IN A CONTENT ADDRESSABLE MEMORY (E.G., BINARY OR TERNARY CAM) TO GENERATE A CONTENT ADDRESSABLE MEMORY RESULT
428
RETRIEVE RECORD FROM MEMORY, THE RECORD INCLUDING A KEY VALUE AND STATISTICS VALUE
430
CORRECT RECORD ?
NO
432
ADVANCE TO NEXT RECORD (E.G., NEXT ADDRESS, VIA A POINTER LINK, ETC.)
YES
434
UPDATE STATISTICS VALUE IN CORRECT RECORD
END
436

FIGURE 4B